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paper on the "Lejeuneae of the United States and Canada," published in the eighth volume of the Memoirs of the Torrey Botanical Club, in 1902. It is the fifth species of the Lejeuneae to be recorded from Canada, the others being *Lejeunea cavifolia* (Ehrh.) Lindb., *L. patens* Lindb., *Cololejeunea Biddlecomiae* (Aust.) Evans, and *C. Macounii* (Spruce) Evans.

9. *FRULLANIA INFLATA* Gottsche in G. L. & N. Syn. Hep. 424. 1845. Evans, Trans. Conn. Acad. 10: 10. *pl.* 3. 1897.

Collected in August, 1899, at Cloudercroft, Sacramento Mountains, New Mexico, by E. O. Wooton, growing on the bark of an oak; also in July, 1901, at Granite Falls, Minnesota, by J. A. Anderson (*No.* 52), growing on rocks; also, in August, 1909, at Walnut, Fairfield County, Ohio, by E. G. Miller, growing on the bark of an elm. The three stations just recorded add considerably to the known range of the species. It bears a strong resemblance to the very common *F. eboracensis* Gottsche and is probably often confused with this species. It is very distinct, however, in its autocious inflorescence and in its leaf-cells, which show trigones but no intermediate thickenings. In *F. eboracensis* the inflorescence is dioicous and the leaf-cells have both trigones and intermediate thickenings, making the contours of the cell-cavities irregular.

10. *ANTHOCEROS LEVIS* L.

Collected in February, 1908, at Walsingham, Bermuda, by Stewardson Brown (*No.* 430). Although this is the first member of the Anthocerotales to be definitely recorded from Bermuda, an immature *Anthoceros*, apparently also *A. levis*, was collected on the island in 1900 by W. G. Farlow.

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### SOME LOPHOZIAS OF THE VENTRICOSA GROUP.

ANNIE LORENZ.

[Read at the Meeting of the Sullivant Moss Society at Boston, Dec. 30, 1909.]

The three species here discussed, *Lophozia longidens* (Lindb.) Macoun, *L. longiflora* (Nees.) Schiffner, and *L. confertifolia* Schiffner, have all been announced for New England by Dr. Evans in Rhodora, but as they have been hitherto but scantily figured, some figures and further notes on their distribution and characters may be of interest.

The first two mentioned were originally considered as varieties of *L. ventricosa*, while the third approaches *L. alpestris*. But as they are quite distinguishable and constant in their typical forms, and each has its characteristic habitat, the modern tendency to segregation seems quite justified.

*L. longidens* (Lindb.) Macoun is evidently the most widely distributed of the three, and is fairly common in the White Mountains, for the writer has specimens from Mts. Osceola, Tecumseh, Carrigain, and the Scaur at Waterville, besides frequently seeing it, though not collected. Macoun, in his Catalogue Part 7, 1902, announced the first American station from Nova Scotia, on wet rocks. Dr. Evans, in Rhodora, 1907, says that "it seems to attain its best development on rocks, but it also occurs on logs."

All the specimens hitherto collected by the writer have been on bark, or in one instance upon rotten wood. Warnstorf would be justified in characterizing it, like the original species of the group, as "hemixerophyt."

About Waterville, N. H., it frequents yellow birch, either live or dead, particularly between 2500-3000 ft. alt., especially on the north and east sides of the trees, and it is fairly abundant along the trail up Mt. Osceola between these heights. Its usual companions are small sterile *Dicranum*, *Plagiothecium*, *Radula*, and little green slender crawling sterile *Jamesoniella*, just the same color as the *L. longidens*. Its zone of best development on the tree is a few feet above the ground, at a convenient height for collecting, for it does not grow about the tree bases, like *Anomodon*. With a little practice, a likely tree can be detected at a considerable distance. When it gets above the line of yellow birch, it takes to the balsam scrub.

Dr. Farlow first reported it from New Hampshire, giving several stations, and Chocora specimens given the writer are also on yellow birch. All these White Mountain stations are more or less in the shade. The Waterville specimens from the Scaur, at 2300 ft. alt. were on rotten wood, on the ground, in the shade of a spruce.

In color *L. longidens* is a rich dark green, about Hooker No. 1, in the field it looks at first sight much like *Sphenolobus exsectus*, but is easily distinguishable with the lens; besides *S. exsectus* does not, as a rule, climb trees, a very rotten log or a bank full of old wood suits it better.

Kaalaas, in his De Dist. Hep. in Nrv., 1889, where it seems to be pretty common, quotes Lindberg's long and excellent description from Arn. & Lindb. Musc. Asiae bor. p. 50. He further says of its habitat: "This species forms small, dense, dark green or brown green tufts on moss-covered, shady, but tolerably dry cliffs, and stones or granitic mountains, sometimes, but more seldom it grows also on old tree trunks, or on rotten stumps preferably of conifers, and then preferably grows in less dense tufts."

It is quite common in the hilly and lower parts of Norway, particularly in the southern and eastern regions, but grows neither on the coast nor on

the highest mountains. He says that he has in only a very few stations seen perianths, and in only one instance had it mature capsules.

The writer has it from along the Osceola trail with abundant antheridial plants, and both young perianths and ones with mature capsules. The "scharfsichtige" Nees described it as a variety of *L. porphyroleuca*, and while the two are perfectly distinct, besides growing in different places, they do agree in the delicately ciliate mouth of the perianth, in contrast to the small teeth of the perianth-mouth in *L. ventricosa*. Schiffner says that the teeth are often as much as six cells long, but this is better observed on a young perianth, as by the time the capsule is mature, the perianth has become somewhat weather-beaten.

The antheridial plants are quite conspicuous, bearing five or six pairs of saccate bracts, each containing one or two large antheridia. They are intercalary in their mode of growth, and old plants will sometimes show the bracts of three successive seasons.

*L. longidens* has leaves with sharply-pointed lobes, and is dark-green, while *L. porphyroleuca* has less clean-cut and blunter lobes to the leaves, with a shallower and more obtuse sinus. They are of about the same size, being the smallest members of this group. The latter is also usually abundantly fertile. Of course with the microscope the large trigones distinguish this latter instantly, for *L. longidens* has cells "thin-walled, except for their minute trigones."

The plants have very abundant rootlets, and cling together, by means of these and of the sharp teeth of the leaves, when a tuft is picked apart.

Gemmae are borne abundantly on the tips of the upper leaves of both sterile and antheridial plants. They have delicate walls and are obtusely tri- or quadrangular, with rounded sides. Dr. Evans says that Dr. Farlow's specimens have green gemmae, and attributes it to their having grown in the shade; but it is probably because they were not quite mature, as many of the writer's specimens have yellowish-brown gemmae.

Warnstorf in *Kryptogamen-Flora der Mark Brandenburg*, gives an excellent figure of the leaf, although it does not occur in the neighborhood of Berlin.

Bernet, in his *Cat. Hep. de la Suisse*, reports it as rare, quoting two stations for it "on rotten logs." In New England it has been so far reported from Maine and New Hampshire only, but there is undoubtedly plenty of it in Vermont, and it may occur among the higher Berkshires. Like all this group, it avoids calcareous localities.

*L. longiflora* (Nees) Schiffn. This "handsome species, goodly to look upon" as Nees approvingly characterizes it, was first reported for New England by Dr. Evans from Schoodic Lake, Maine. It appears to be rather well distributed among the White Mountains, as the writer has collected it from three widely separated stations, Eagle Lake on Mt. Lafayette, 4000 ft. alt., Carrigain Pond, 3100 ft. alt., and the head-wall of Split Cliff Ravine on Mt. Osceola, 3800 ft. alt., the two latter having plants with perianths. It evidently prefers high and cold localities, in the sun.

Nees, its original author, gives a comprehensive description in his *Naturges. der Eur. Leberm.* and was obviously well acquainted with the plant. Schiffner, distributing it in his *Hep. Eur. exs. III Serie*, nos. 138 & 139, quotes freely from Nees, and differs from Macoun in his *Cat. Canadian Plants*, who puts it on his list, but says "scarcely a variety." Probably he did not have good plants with perianths.

It lives among the *Sphagnum*, in bogs, the Split Cliff specimens were on the *Sphagnum* on wet rocks at the sides of the headwall. In the field it looks like a robust *L. ventricosa*, much tinged with carmine, and with fat perianths. As it is often pale in color, and is ruffly with crowded leaves, it bears a superficial resemblance to *L. Marchica*, but that is delicate apple green in color, with purple stems, and comes straggling up through the *Sphagnum*, while *L. longiflora* crawls about on top.

The leaves are crowded, more or less transversally inserted, wide, with broad, rounded sinus, and acute lobes. Leaf cells with rather smaller trigones than in *L. porphyroleuca*. The carmine of stem, leaf-bases and tips of the shoots affords a safe mark of distinction from the red-brown and purple of *L. porphyroleuca*. Rhizoids are abundant.

The perianth is large, well streaked with carmine, not split into lobes at the mouth, and furnished with separate, slightly projecting, one-celled teeth, much like *L. ventricosa*.

Nees dismisses the ♂ plants with the statement—"Männliche Blüten konnte ich nicht entdecken." Schiffner says of his *exsiccatae* specimens "♂ Pflanzen hie und da vertreten," without further description, but they are few and far between. Critical examination of all the New Hampshire material resulted in the detection of one ♂ plant from Carrigain Pond, with last year's bracts. They were intercalary in their mode of growth, there were five pairs of bracts, about the same size as the ordinary leaves, but gibbous-saccate, and with rather sharper teeth to the lobes. The antheridia had departed, and no young spikes could be found.

Nees make no mention of the gemmae; Schiffner says merely that they are pale. The Carrigain Pond specimens are provided therewith. They are watery green, 3- or 4-angled, very thin-walled, one-celled and clinging together chainlike by twos and threes. These are young gemmae.

*L. longiflora* has probably been frequently overlooked among our New England mountains, and should be sought in Vermont.

*L. confertifolia*, a recent species of Schiffner's, and but a few times collected in Europe, was first found in New England, by the Cowles party, on Mt. Katahdin, and was announced by Dr. Evans in *Rhodora* for March, 1907.

Subsequently the writer detected it among some old material from Mt. Mansfield, but as it was collected in 1906, she must confess to no longer recalling the exact spot where it was found. From the appearance of the plant, it grew upon the ground, as the under side is full of specks of mica schist.

Schiffner says "it exhibits however also some characters peculiar to itself, especially in the collective aspect of the plant, so that once rightly known it is easily to be recognized again by the practised eye." This peculiar effect lies in the crowded leaves, from which its name is derived.

"It grows in flat, thickly interwoven tufts on alpine humus or moor-ground, also over earth-covered stones, in fairly damp as well as drier situations -- the plants are mostly 1 cm. long, creeping, with ascending tips, and very numerous rhizoids." They are tinged with brown like *Marsupella sphacelata*. "The leaves are thickly and almost transversally attached, and concave, often also with the tips somewhat bent over and surrounding the stem on the dorsal side, so that seen from above the effect is ladder-like, giving the plant its characteristic appearance."

The leaves are broadly elliptical, with a somewhat unsymmetrical, broad, obtuse sinus, with slightly unequal lobes, often distorted by gemmae. The leaf-cells have thin walls and small trigones. The involucreal leaves are larger than the stem-leaves, and of similar form, although more deeply and sharply divided, with sharp tips to the lobes, the bracteole is about two-thirds the length of the involucreal leaf, and connate with it far up, so that the latter appears unequally trifid.

Schiffner states that the European specimens are abundantly fertile; but the Katahdin plants are sterile, while the Mansfield plants have some involucreal leaves, but no developed perianths. The species is dioicous. The perianth is green, only the little teeth about its mouth hyaline; rather small, under the circumstances, plicate at the strongly narrowed mouth,

which is provided with small, separate teeth, most two cells long. Capsule and spores are chestnut-brown.

The male plant is slender, and the usually terminal androeceum forms a cone-like spike, with about fifteen pairs of closely imbricated bracts, mostly containing two antheridia.

Gemmae present in great abundance, at the apex of the shoots pale green, on the older leaves sometimes reddish. They are small, obtusely tri- or quadrangular, seldom divided, the leaf-tips are often eaten away by them.

The species avoids limestone. Careful search of the mountains about Waterville, N. H., has been hitherto unavailing. It certainly shuns the crumbly trachytic granite of Mt. Osceola, at least. The most likely place for it is Mt. Lafayette, as that most resembles Mt. Mansfield, and any bryologist visiting that range is earnestly requested to watch for it, after passing Eagle-Lake, from the timber-line up.

Schiffner, in his notes on *L. longiflora* in his Hep. Eur. Exsiccatae, gives his reasons for recognizing these "kleine Arten." "It is impossible to tell which is the Stammform within the whole group, beneath which the others are to be arranged as varieties or subspecies — quite possibly none of the described or now living forms. One could imagine, that through making "little species," that naturally only are distinguished by the specialist with certainty, the study of the hepaticae will be made too difficult for the beginner. Aside from the fact, that Science needs not to take such things into consideration, it is for the beginner to consider, that one must use more trouble and time for the working into a complicated and difficult matter than in the easier field, and such as have not command over an iron diligence and a limitless patience, had better remain far away from the study of Hepaticology."

However, for anyone who is determined to have acquaintance with these plants, they will amply repay all effort expended upon them, for Warnstorf declares their study to be "die reinste Freude, die man haben kann."

Hartford, Connecticut.

December, 1909.

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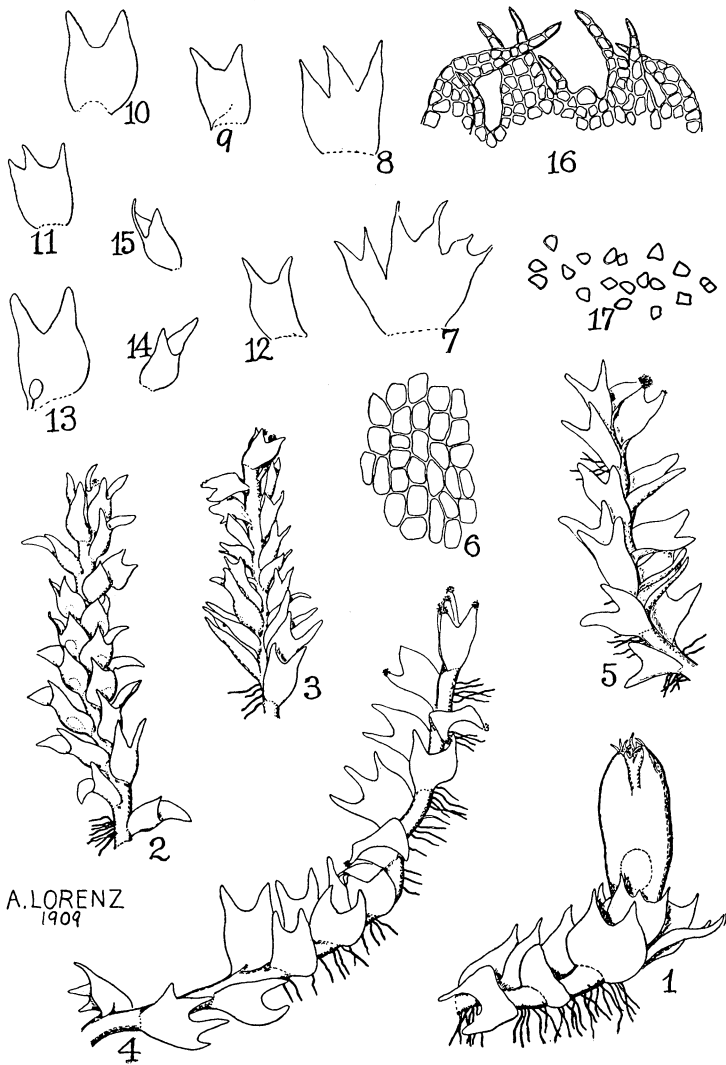


PLATE III.



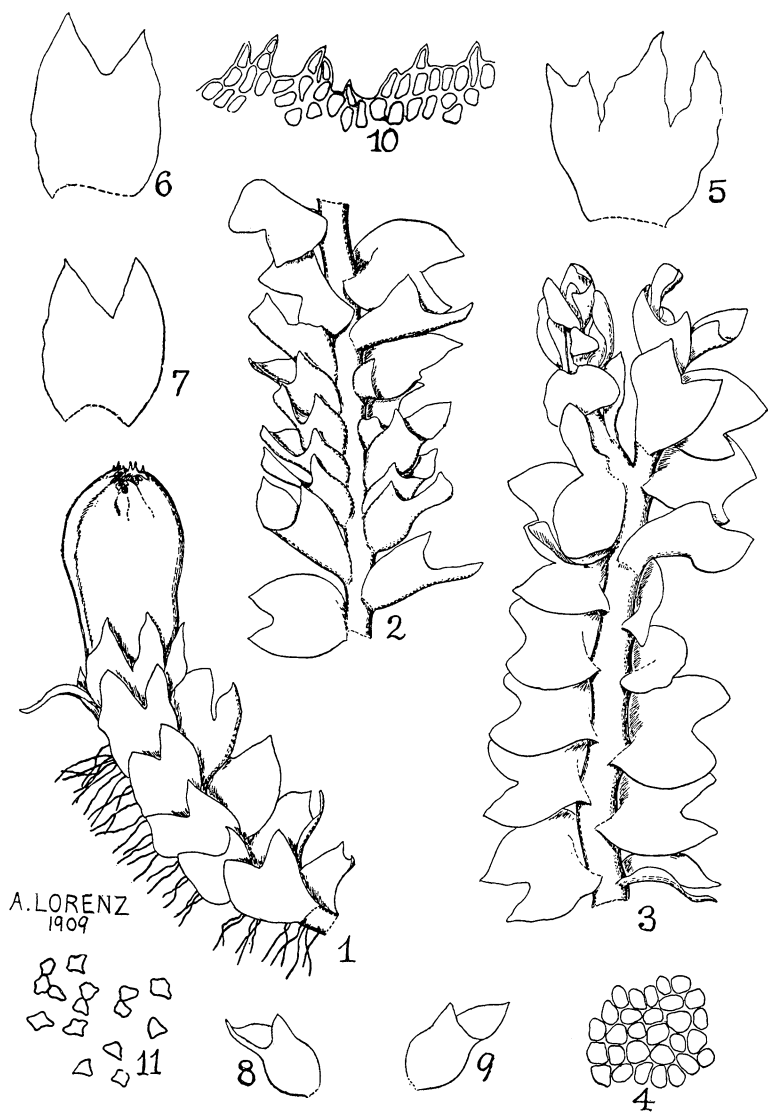
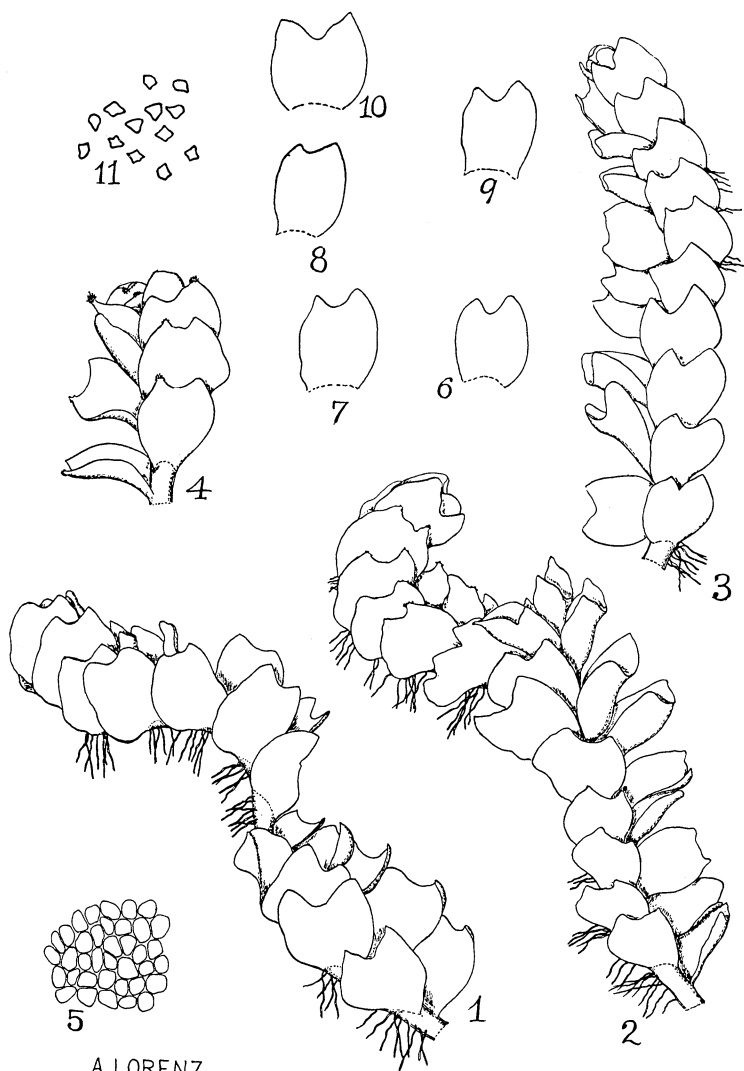


PLATE IV.



A. LORENZ  
1909

PLATE V.

**Explanation of Plate 3.**

*Lophozia longidens* (Lindb.) Macoun.

- FIG. 1. Branch with perianth, antical view.  $\times 87$ .  
“ 2. Branch with ♂ inflorescence, antical view.  $\times 87$ .  
“ 3. Branch with old perigonal bracts.  $\times 87$ .  
“ 4, 5. Sterile branches.  $\times 87$ .  
“ 6. Cells from middle of leaf.  $\times 430$ .  
“ 7, 8. Perichaetial bracts.  $\times 87$ .  
“ 9, 10, 11, 12. Leaves.  $\times 87$ .  
“ 13, 14, 15. Perigonal bracts.  $\times 87$ .  
“ 16. Teeth from mouth of perianth.  $\times 430$ .  
“ 17. Gemmae.  $\times 430$ .

The figures were all drawn from specimens collected by the writer at Waterville, N. H.

All reduced to two-fifths

PLATE 4. *Lophozia longiflora* (Nees) Schiffner.

- FIG. 1. Plant with perianth, antical view.  $\times 87$ .  
“ 2. Plant with ♂ inflorescence, antical view.  $\times 87$ .  
“ 3. Sterile plant.  $\times 87$ .  
“ 4. Cells from middle of leaf.  $\times 430$ .  
“ 5. Perichaetial bracts.  $\times 87$ .  
“ 6, 7. Leaves.  $\times 87$ .  
“ 8, 9. Perigonal bracts.  $\times 87$ .  
“ 10. Teeth from mouth of perianth.  $\times 430$ .  
“ 11. Gemmae.  $\times 430$ .

Figures 2, 8, 9, 11, were drawn from specimens from Carrigain Pond, N. H., the others from Waterville, N. H.

All reduced to two-fifths.

PLATE 5. *Lophozia confertifolia* Schiffner.

- FIG. 1, 2, 3, 4. Sterile plants, antical view.  $\times 87$ .  
“ 5. Cells from middle of leaf.  $\times 430$ .  
“ 6, 7, 8, 9, 10. Leaves.  $\times 87$ .  
“ 11. Gemmae,  $\times 430$ .

The figures were all drawn from specimens collected by the writer on Mt. Mansfield, Vt.

All reduced to two-fifths.